

Reducing Emissions from Ships in the Baltic Sea Area

The feasibility of introducing a
distance-related en-route charge

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European Federation for
TRANSPORT and ENVIRONMENT



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Per Kågeson (Nature Associates), T&E 05/2

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Executive Summary

The report investigates the feasibility of a kilometer charging system for sea vessels in the Baltic Sea. The idea is to mandate port authorities to collect, in addition to port dues, a mandatory fee that relates to the calling ship's last trip in Baltic Sea waters and the ship's emissions of NO_x and sulphur during that journey. The port would report the trip and transfer the revenue to a common authority in charge of a Baltic environmental ships register. In addition, the authority would use the AIS-system to check the number of kilometres travelled in European waters and carry out a limited number of random checks of on-board facilities for NO_x-abatement and reduction of sulphur emissions.

The revenue could be returned to the owners of the vessels in a way that does not disturb the function of the charge. There are several options for recycling the money. It could be done based on the ship's annual net-energy consumption or on the number of gross registered tonne kilometres produced in the designated area by each ship owner. A third alternative could be to design a 'cap and trade' scheme, where the average ship would have to comply with a baseline or benchmark value (kg/kWh) that is successively lowered over a period of years. This, however, would require the industry to establish a trading platform for emission permits. A fourth possibility would be to use the revenue to fund grants to ships that invest in NO_x and/or sulphur abatement technologies. Under this kind of regime, ship owners who invest in sulphur- and NO_x-abatement technologies would receive more than they pay, and owners of high polluting ships would pay more than they get back. For the industry as such it would be a zero sum game.

By using a flexible policy instrument instead of mandatory technical standards and by making clear that charges are only applied to ships calling at ports in States that have chosen to participate, the potential conflict with the right of innocent passage can be avoided. The ship owner or his customers could alternatively choose a port that is not part of the programme; this is a risk that those creating and adopting such a scheme should be aware of.

The scheme would not be in conflict with UNCLOS' Article 26 that states that no charge may be levied upon foreign ships by reason only of their passage through the territorial sea, and that charges may be levied upon a foreign ship passing through the territorial sea as payment only for specific services rendered to the ship. UNCLOS does not limit the right of coastal states to introduce non-discriminatory charges on voluntary port calls.

When designed in this manner and collected only in the ports of participating States, the introduction of a distant-related en-route charge is neither conditional on amendments to MARPOL nor on the approval of non-participating States.

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1. Background

The Baltic Sea has some of the busiest shipping routes in the world. Around 2,000 sizeable ships are normally at sea at any time in the Baltic. Maritime transportation is potentially an environmentally friendly way of transporting goods and passengers, but current practices include extensive emissions of nitrogen oxides (NO_x), sulphur oxides (SO_x) and particulate matter (PM). In order to become a cleaner mode of transport, maritime shipping has to reduce considerably its emissions of air pollutants and to develop systems for firm control of illegal discharges of sludge and other types of waste.

Shipping activities contribute significantly to the air pollution in the Baltic Sea region.

Emissions of SO_x from shipping due to combustion of marine fuels with high sulphur content contribute to air pollution in the form of sulphur dioxide and particulate matter, harming the environment and human health, the latter particularly around coastal areas and ports.

NO_x emissions from ships cause acid depositions that can be detrimental to the natural environment and also contribute to eutrophication. Shipping (in both Baltic and North Seas) is among the largest contributors to NO_x deposition to the Baltic Sea. NO_x also contributes to the formation of ground level ozone, which is a major health hazard as well as a very important greenhouse gas.

According to the recent projections in emissions prepared for the European Commission's Clean Air For Europe (CAFE) programme, emissions of NO_x from international shipping are expected to increase by two thirds between 2000 and 2020, and those of SO_x by nearly a half, and this even after the implementation of Annex VI of MARPOL 73/78 (see below) concerning air pollution by ships (Amann, M. et al, 2004). According to this estimate, NO_x and SO_x emissions from international shipping in Europe will have surpassed the emissions from all land-based sources in the 25 EU member states combined by 2020. There is thus cause to look for further reductions from maritime shipping. Such emission reductions are necessary to attain the long-term objectives for the protection of human health and the environment, as was laid down by the EU's Fifth and Sixth Environmental Action Programmes, the NEC-directive (2001/81/EC), and the 1999 Gothenburg Protocol to the Convention on Long-range Transboundary Air Pollution. Reducing emissions from ships is also a way of reducing the cost of achieving such targets. Most inexpensive measures aimed at emissions from land-based sources have already been used.

Low cost techniques for reducing considerably the emissions of NO_x and sulphur from shipping are available (Kågeson, 1999). Therefore, the real challenge is legal and political rather than technical. One of the problems in this context, is that the amount of air pollutants emitted from sea going vessels are not covered by any international agreement on the abatement of air pollution. Neither the 1999 Gothenburg Protocol to the **Convention on Long-range Transboundary Air Pollution** (the LRTAP Convention), signed by 31 countries in Europe and North America, nor the European Union's **Directive on national emission ceilings** (2001/81/EC), that both set binding emission ceilings to be attained by each member state by 2010, cover emissions emitted from vessels in European waters.

The Baltic region is currently one of the most dynamic regions in the world. Maritime shipping in the area is expected to grow between 70 to 100 per cent between 2005 and

2015. In order to prevent economic growth from having adverse effects on the natural environment, further measures to reduce emissions from shipping are urgently needed.

2. The objective of this paper

The purpose of this paper is to explore the feasibility of introducing kilometer charging for maritime transport. The idea is to try to develop a regime that internalises the social costs of sea transport in a similar way to what has been proposed for road transport. In order to do so, it is necessary to address all potential practical and legal obstacles. Among these are the following issues:

1. Is it possible to effectively measure and control emissions covered by the charge?
2. Would the scheme conflict with the right of innocent passage as expressed in the United Nations Convention on the Law of the Sea (UNCLOS)?
3. Would emission charging conflict with the rules of UNCLOS Article 26, which declares that no charge may be levied upon foreign ships by reason only of their passage through the territorial sea, and that charges may be levied upon a foreign ship passing through the territorial sea as payment only for specific services rendered to the ship.
4. Would the introduction of kilometer charging require an amendment to MARPOL 73/78 in order to avoid conflict with harmonised international regulations?
5. Would a decision on kilometer charging in European waters require an unanimous vote in the Council of Ministers?

In order not to make the task unduly complicated, the analysis of this paper is limited to charging for emissions of nitrogen oxides and sulphur dioxide from shipping in the Baltic Sea. However, provided that the idea of a distance-related en-route charge proves feasible it should be possible to extend the scheme to additional pollutants or hazards.

3. Internalisation of the external costs of all modes of transport

In 1995, the European Commission published a Green Paper, "Fair and efficient pricing in transport". It did not contain any concrete proposals but instead proposed a set of guiding principles for the internalisation of transport externalities:

- Charges should be linked closely to underlying costs;
- Charges should be differentiated to reflect differences between vehicles/vessels;
- The price structure should be clear and transparent;
- Charges should be non-discriminatory;
- Full infrastructure costs should be recovered.

The principles apply to all types of vehicle and to all modes of transport.

The Commission's 1998 White Paper "Fair Payment for Infrastructure Use" took a different stand on full cost recovery. It underlined the importance of marginal social cost pricing, meaning that transport charges should reflect as closely as possible the extra costs

for tear and wear, congestion, accidents and pollution caused by additional infrastructure use.

The White Paper recognises that most costs caused by heavy road vehicles cannot be efficiently internalised without taking both distance and vehicle characteristics into account. The same is true for aviation and maritime transport. Kilometre charging is a method that allows for this kind of differentiation and that can be applied to all vehicles regardless of its nationality. From an efficiency point of view, charges should be linked as closely as possible to underlying costs, it therefore makes sense to use distant-related charges for internalising all costs except those directly associated with the choice of fuel.

In the 2001 White Paper “European Transport Policy for 2010”, the Commission says that the aim of Community action should be “gradually to replace existing transport system taxes with more effective instruments for integrating infrastructure costs and external costs”. The Commission decided to prepare legislation in three steps; (i) a methodology paper (to appear in 2002), (ii) a framework directive covering all modes of transport, and (iii) a daughter directive for each of the four modes of transport. For road transport the new directive would replace or amend the current “Eurovignette directive” on the charging of heavy goods vehicles.

However, in the spring of 2003, the Commission scrapped its three-step-strategy in favour of a proposal for amending Directive 1999/62/EC on the charging of heavy goods vehicles for the use of certain infrastructures. The Commission proposes a system of weighted average tolls that shall be related to the costs of constructing, operating, maintaining and developing the infrastructure network concerned. The Commission thereby turned its back to the principle of social marginal cost pricing that was expressed in the earlier white paper. However, in its new proposal the Commission says that the toll should be differentiated for the axle weight and the environmental class of the vehicle. Member States may also differentiate the toll for differences in geographical impact and congestion. Toll in this context is a charge related to the distance travelled and is thus synonymous with kilometer charging.

4. Policy instruments for reducing emissions from shipping

The report by NERA (2004) on behalf of the European Commission provides information on the feasibility of a broad range of market-based approaches to regulate atmospheric emissions of NO_x and sulphur from seagoing ships in European Union (EU) sea areas.

NERA evaluated programmes in two broad categories: (1) emissions trading programmes, in which participants trade “quantities”; and (2) emissions charging programmes. The evaluation covered six market-based programmes (three trading and three charging), and because of the tradeoffs among the various dimensions in specifying elements of each programme, NERA developed multiple approaches for each of the six programmes based upon key elements such as the sources that would participate and the administrative requirements related to certification and monitoring.

The various market-based approaches share advantages relative to less flexible regulatory approaches, such as a requirement that every ship achieve the same emission rate or install the same equipment/fuel. But the wide range of approaches also illustrates potential tradeoffs among the approaches. NERA thinks that perhaps the most fundamental tradeoff is on the one hand, between broad and comprehensive approaches that promise

major cost savings and environmental gains, but would require a major shift in legal and political acceptability and substantial administrative costs, and on the other hand between more modest approaches that would provide smaller cost savings and environmental gains, but would involve less substantial administrative costs and fewer legal and political obstacles.

Given the relative novelty of market-based techniques for the marine sector, NERA believes that it is best to start with more modest programs. Although none is perfect, three approaches seem, according to NERA, promising means of beginning the use of market-based approaches to promote low-emission shipping in EU waters:

1. ***“The stringent credit-based approach”*** is a credit-based trading programme. Credit programmes provide tradable “credits” to facilities that voluntarily reduce emissions below their “business as usual” (BAU) levels. These credits can be traded and counted toward compliance by facilities that would face high costs or other difficulties in meeting their emissions requirements. In the shipping context, a credit-based program would allow ship owners to reduce emissions and sell the emission reduction credits to land-based sources assumed to be subject to a cap-and-trade programme. A stringent approach would require shippers to achieve emission rates below BAU levels—in order to provide net emissions reductions—and also to provide clear evidence of BAU levels in order to avoid “anyway tons,” i.e., reductions that would occur without the programme. Continuous monitoring equivalent to that required for land-based sources would be required for shipping sources participating in the programme. The approach would not be feasible without the development of a cap-and-trade approach for land-based sources of SO₂ and NO_x. A rigorous credit-based approach would provide net decreases in EU emissions, as credits trades would require more than a 1:1 trading ratio. But the programme would still be voluntary, and thus any shippers that did participate would gain. Of course, land-based sources would also gain from being able to take advantage of lower-cost reductions in the shipping sector.
2. ***“The consortia benchmarking approach.”*** Benchmarking programmes identify a specific emissions *rate* to apply to covered activities and require that the average emission rate from these activities does not exceed the benchmark level. In contrast to the credit-based approach, benchmarking is a mandatory rather than a voluntary programme. The benchmark rate establishes a baseline. Sources subject to the programme can trade credits amongst each other and thereby lower the cost of meeting the emissions rate target. In the shipping context, a benchmark trading programme would set an emission rate for ships subject to the programme and allow ship owners (or operators) to buy and sell credits based upon a formula linking emission rates to credits. The most promising variety of benchmarking, according to NERA, is to allow consortia of shipowners to band together to reduce the cost of meeting more stringent limits. This would provide gains both to shippers and to the environment. The more stringent limits would yield environmental gains, as would the development of differential ratios based upon vessel location and stricter emissions monitoring and reporting regimes. The voluntary nature of the program would allow vessels that are able to benefit from emissions trading to do so. This approach, however, would still face legal and political challenges (i.e. changes would required in the IMO and fuels directive) although

the obstacles, according to NERA, are likely to be smaller than for the credit-based approach.

3. **Voluntary port dues differentiation.** A system of differentiated port or fairway dues would take advantage of the fact that many ports and some countries already impose charges on vessels that use their facilities and waters. Differentiated charges in this context would involve setting port dues based partly on emissions of various pollutants. Such a system of differentiated dues has been used in various Swedish ports since 1998 to encourage reductions in NO_x and SO₂ emissions, with about 20 Swedish ports using such a revenue-neutral system. Other countries have developed similar programmes that impose dues differentiated on the basis of environmental criteria. The voluntary differentiated port dues approach would provide ports with an environmentally differentiated framework, with ports free to use the framework or not. The European Commission could encourage this development by developing emissions indices and recommended differentiation formulas for ports to use.

NERA admits that there are other policy instruments that might be more efficient than the three out-lined above but says that they would require additional legal elements to be put into place in order for the approach to be feasible. In addition, there are elements of the design that affect their political acceptability.

On taxation approaches, NERA says that a fundamental political difficulty is that these would require unanimous agreement by the European Council. Moreover, the tax might be subject to challenge on legal grounds under UNCLOS Article 26, which guarantees innocent right of passage for foreign-flag vessels without being subject to charges except for services received.

Using a distance-based approach would improve the potential accuracy of the charges. But this greater accuracy would, according to NERA, come at the expense of greater administrative and monitoring costs. In addition, NERA believes that an en-route charging programme would face the same legal and political obstacles as an emissions tax.

However, NERA makes no attempt to analyse the feasibility of giving a distance-based en-route charge a design that does not conflict with UNCLOS and that does not require a unanimous decision by the European Council.

5. A draft proposal for kilometer charging in the Baltic Sea

To be able to investigate the feasibility of a kilometer charging system in the Baltic Sea it is necessary to present a draft scheme. The idea in this paper is to mandate the port authorities around the Baltic sea to collect, in addition to port dues, a mandatory fee that relates to the calling ship's latest trip in Baltic Sea waters and the ships' emissions of NO_x and sulphur during that journey.¹ The port would report the trip and transfer the revenue to a common authority in charge of a Baltic environmental ships register. In addition, the authority would check the number of kilometres travelled in European waters and carry out a limited number of random checks of on-board facilities for NO_x-abatement.

Where kilometer charging of road transport is concerned, the European Commission proposes that the fee should be based on the average weighted cost of constructing, operat-

¹ The scheme could at a later stage potentially be extended to other pollutants, such as particulate matter.

ing, maintaining and developing the infrastructure network concerned. As road transport infrastructure requires heavy investment and high expenditure for maintenance, there is ample room for environmental differentiation of the average fee.

Maritime transport differs from road transport by having much lower infrastructural costs. Most Member States have open coastlines with short fairways between ports and sea. Only a few countries do currently charge vessels for their use of fairways. For example, Sweden's many archipelagos make it necessary for the country's Maritime Administration to maintain relatively long fairways at a considerable annual cost. The enforcement of fairway dues has thus made it possible for Sweden to provide incentive to clean shipping by an environmental differentiation of the dues. This option is not available to Member States that have little or no reason for infrastructure charging.

An environmental differentiation of port dues is an alternative option open to all Member States. However, a problem in this context is that port dues are often negotiated between ports and their major customers. Thus it is difficult for competing ports to know whether a port really differentiates its dues according to strict environmental parameters. The lack of transparency, fierce inter-port competition and difficulties to take account of the distance travelled make differentiated port dues a less promising alternative.

This would be different if the Commission's proposal for a revision of the road toll directive made road vehicles pay for their social marginal cost. Then sea transport could also be made liable for the social marginal cost of its emissions (provided that charging does not conflict with international agreements). However, with the current proposal for road vehicles in mind and in order not to put an excessive burden on marine transport, it makes sense at the end of each fiscal year to recycle the money from the distant-related en-route charge to the ships that contributed to the revenue.

En-route charges on NO_x and sulphur could be modelled on the existing and successful Swedish charge on NO_x-emissions from large land-based furnaces, where the money is returned to the owners based on their annual net-energy production. However, in the case of shipping, a better ground for recycling money might be to divide the total annual revenue from the scheme on the number of gross registered tonne kilometres produced in the designated area by each ship owner. One could also contemplate alternative ways of recycling the money. One way could be to design the system as a cap and trade scheme, where the average ship would have to comply with a baseline or bench-mark value (kg/kWh) that is successively lowered over the years. This, however, would require the industry to establish a trading place for emission permits. Another possibility would be to use the revenue for funding grants to ships that invest in NO_x and/or sulphur abatement technologies. There might be additional options for returning the money in ways that do not disturb the function of the charge.

Provided that the level of the charge is accurately set², this programme would provide a correct marginal incentive without causing the average ship to pay more than it will receive back. However, ship owners who invest in NO_x-abatement technologies would receive more than they pay, and owners of high polluting ships would pay more than they get back. For the industry as such it would be a zero sum game. In this respect, this type of charge would resemble a scheme of emissions trading regardless of how the money is returned.

² The objective of this paper is not to analyse the size of the charge.

For reasons of simplicity, ships calling fewer than X times per year at ports covered by the scheme could potentially be excluded from the requirements. It is also important to note that trips from participating ports to non-participating ports (most of them in other sea areas) would not be covered by any charge.

6. Conventions on maritime traffic and air pollution from ships

Before going into details, it is appropriate to present briefly the three international conventions that are important with regard to the right of passage and the abatement of air pollution emissions in the Baltic Sea:

- The United Nations Convention on the Law of the Sea (UNCLOS)
- The International Convention for the Prevention of Marine Pollution from Ships (MARPOL 73/78)
- The Helsinki Convention on the Protection of the Marine Environment of the Baltic Sea Area

The United Nations Convention on the Law of the Sea

The United Nations Convention on the Law of the Sea (UNCLOS) provides a universal legal framework for the management of marine resources and their conservation. It is a result of the Third United Nations Conference on the Law of the Sea that was convened in New York in 1973. It ended nine years later with the adoption in 1982 of the convention.

Navigational rights, territorial sea limits, economic jurisdiction, legal status of resources on the seabed beyond the limits of national jurisdiction, passage of ships through narrow straits, conservation and management of living marine resources, protection of the marine environment, and a marine research regime are among the features of the treaty.

UNCLOS regulates the right of innocent passage. Part XII of the convention provides the legal framework for the protection and preservation of the marine environment.

The International Maritime Organization (IMO) and MARPOL

According to the Convention on the International Maritime Organization, among the main purposes of IMO are:

(a) To provide machinery for co-operation among Governments in the field of governmental regulation and practices relating to technical matters of all kinds affecting shipping engaged in international trade, and to encourage the general adoption of the highest practicable standards in matters concerning maritime safety, efficiency of navigation and prevention and control of marine pollution from ships; and to deal with administrative and legal matters related to the purposes set out in this Article;

(b) To encourage the removal of discriminatory action and unnecessary restrictions by Governments affecting shipping engaged in international trade so as to promote the availability of shipping services to the commerce of the world without discrimination.

MARPOL 73/78

Emissions and discharges from maritime shipping are regulated by IMO's **International Convention for the Prevention of Marine Pollution from Ships, 1973 as modified by**

the Protocol of 1978 relating thereto (MARPOL 73/78). As the 1973 Convention had not yet entered into force, the 1978 MARPOL Protocol absorbed the parent Convention. The combined instrument - MARPOL 73/78 - finally entered into force on 2 October 1983 (for Annexes I and II).

Globally air pollution from ships is regulated by Annex VI on **Regulations for the Prevention of Air Pollution from Ships**, which will enter into force 19 May 2005. Annex VI covers ozone-depleting substances, nitrogen oxides (NO_x), sulphur oxides (SO_x) and volatile organic compounds (VOC).

The Helsinki Convention

For the first time ever, all the sources of pollution around an entire sea were made subject to a single convention, when the Helsinki Convention on the Protection of the Marine Environment of the Baltic Sea Area was signed in 1974 by the then seven Baltic coastal states. The 1974 Convention entered into force on 3 May 1980.

In the light of political changes and developments in international environmental and maritime law, a new convention was signed in 1992 by all the states bordering the Baltic Sea, and the European Community. After ratification, the Convention entered into force on 17 January 2000. The Convention covers the whole of the Baltic Sea area, including inland waters as well as the water of the sea itself and the sea-beds. Measures are also taken in the whole catchment area of the Baltic Sea to reduce land-based pollution that would effect the environmental quality of the sea.

Among the governing principles of the Helsinki Convention are the Precautionary principle, the Pollutor Pays principle and the principle of promoting the Best Environmental Practices and Best Available Technologies. In addition, the Convention states that additional measures shall be taken if the consequent reductions of inputs do not lead to acceptable results.

Do the conventions cover emissions that damage terrestrial ecosystems?

It is not self evident that conventions for the protection of the marine environment apply to terrestrial ecosystems, the protection of human health or the damage to materials caused by air pollutants.

Emissions of sulphur, in the quantities emitted from shipping, are not known to have any significant negative effects on the sea itself or on the marine life. Instead sulphur oxides cause acidification of terrestrial and freshwater ecosystems, damage materials (e.g. buildings and monuments), and have a negative impact on human health. Emissions of particles are a similar case. They can stay airborne over long distances, cause heart attacks and cancer in human beings, but they are not known to have any significant impact on marine species. Besides contributing to the eutrophication of coastal seas, emissions of nitrogen oxides contribute to the acidification of terrestrial ecosystems and to the formation of ground-level ozone and secondary particles.

The environmental scope of all three conventions were originally limited to the negative impact on the marine environment of pollution and accidents. The IMO, however, has in recent years adopted MARPOL's Annex VI and a resolution on greenhouse gases. Annex VI introduces *SO_x emission control areas*, where the adoption of special mandatory measures for SO_x emissions from ships is required in order "to prevent, reduce and control air pollution from SO_x and its attendant adverse impacts on land and sea areas". In 2003, IMO adopted a resolution A.963(23) on policies and practises related to the reduc-

tion of greenhouse gas emissions from shipping, and in 2004, its Marine Environment Protection Committee agreed on draft guidelines on a CO₂ indexing scheme.

It makes sense that IMO, being the only existing global organisation with responsibility for shipping, has stretched its mandate to cover emissions that are harmful to terrestrial ecosystems and human health.

7. Measuring emissions of nitrogen oxides and sulphur

MARPOL's Annex VI sets limits on emissions of nitrogen oxides (NO_x) from diesel engines. A mandatory NO_x Technical Code, developed by IMO, defines how this is to be done. This technical code could be used also with regard to emission levels below the mandatory value. An International Air Pollution Prevention Certificate shall be issued to any ship of 400 gross tonnage or above engaged in voyages to ports under the jurisdiction of other Parties. All ships concerned must have received its certificate no later than the first scheduled dry-docking after entry into force of the Annex VI protocol, but in no case later than three years after entry into force of the protocol (i.e. 19 May 2008).

The Swedish National Maritime Administration has since the late 1990s registered specific emissions of NO_x (per kWh) for ships applying for reduced fairway dues. An additional opportunity would be to measure the true emissions of nitrogen oxides as the ship moves. For land-based furnaces of a size equal to those of the main machineries of large ships this is already standard, and technologies for continuous monitoring of NO_x from ships are now being developed.

The emission of sulphur from ship engines is proportional to the sulphur content of the bunker oil. In a case where the shipowner has installed a scrubber for cleaning the exhaust fumes from sulphur, a certificate proving the efficiency of the equipment would be required.

All different market-based programmes presented by NERA (2004) would require participating ships to register their specific emissions of NO_x (g/kWh or g/km at normal speed). This would necessitate a common, European-wide, environmental ships register. Where sulphur dioxide is concerned, all NERA programmes but one (fuel tax at the pump) would require participating ships to carry some kind of certificate guaranteeing the sulphur content of the bunker oil. Thus a vital part of the transaction costs would be more or less the same in all cases presented by NERA, although the number of participants would, of course, differ between voluntary and mandatory programmes.

Measuring distance by the AIS system

To make charges distant-related, it would be necessary to register the distance travelled by each ship in the area covered by the scheme. This could be done with **the Automatic Identification System**, AIS, which automatically transmits the identity of the all ships above 300 gross tonnage.

The purpose of the AIS system is mainly to help the watch officer on board to take appropriate measures to avoid collisions or other calamities. The system will give him direct up-dated information about all other ships in the vicinity that are also equipped with AIS, as well as the possibility to add it to electronic charts onboard.

In addition, the system also transmits information to the shore. This is extremely useful for Vessel Traffic Systems, VTS, i.e. guiding the ship in congested areas, but is equally

important for the Marine Rescue Co-ordination Centres, MRCC, in giving actual up-dated information on all ships participating in a rescue action. The information sent between the ships and to and from the shore comes in four categories:

1. **Static information** which basically is the ship's standard details helping to identify it.
2. **Dynamic information** which is continuously updated at a rate varying from two seconds to three minutes depending upon traffic situation. It contains: position, time, speed, course over ground, heading, navigational status and rate of turn.
3. **Voyage related information** contains ships actual draft and cargo type, if this is hazardous goods, destination and estimated time of arrival.
4. **Safety related information** consists of short messages on weather conditions and navigational warnings. This information is generally transmitted from shore to ship.

The heart in the Automatic Identification System is a transponder on board of the ship. The transponder consists of three main components, a GPS-receiver, a VHF-transceiver and in between them a computerised data processor. The Global Positioning System, (GPS), uses signals from multiple satellites to give the position of its antenna and also a very accurate time reference. Other ships within VHF-range and equipped with an AIS transponder receive the information, as well as coastal centres.

AIS is compulsory on all passenger ships and on all cargo ships of 300 gross tonnage and more engaged in international voyages. Ships above 500 tons and not on international voyages will be equipped with AIS before 1 July 2008.

The nations around the Baltic Sea have agreed to establish shore-based AIS infrastructure to cover most of the Baltic Sea. The information received shall be exchanged between the countries. The implementation of this system is now well under way. The European Union requires all coastal states in the Union to establish shore based AIS infrastructure by 1 July 2007.

Conclusion

Measuring emissions and/or registering the specific emissions from different vessels appear not to be a technical problem. The AIS system makes it possible to identify all ships and to measure the distance that each ship travels in the Baltic Sea area.

8. The right of innocent passage

According to UNCLOS' Article 19, "passage is innocent so long as it is not prejudicial to the peace, good order or security of the coastal State. However, "passage of a foreign ship shall be considered to be prejudicial to the peace, good order or security of the coastal State" if in the territorial sea it engages in any of a number of activities, among them "any act of wilful and serious pollution" contrary to the UNCLOS convention.

Article 21, on *Laws and regulations of the coastal State relating to innocent passage*, states that a coastal State may adopt laws and regulations, in conformity with the provisions of the Convention and other rules of international law, relating to innocent passage through the territorial sea, in respect of (among others) any of the following:

- (d) the conservation of the living resources of the sea;

(f) the preservation of the environment of the coastal State and the prevention, reduction and control of pollution thereof.

However, “such laws and regulations shall not apply to the design, construction, manning or equipment of foreign ships unless they are giving effect to generally accepted international rules or standards.”

According to Article 24, the coastal state may not impose requirements on foreign ships which have the practical effect of denying or impairing the right of innocent passage or discriminate in form or in fact against the ships of any State or against ships carrying cargoes to, from or on behalf of any State.

However, there is also a Part XII of the Convention that regulates the protection and preservation of the marine environment. The articles of Part XII (see section 9) provide a legal framework for enforcing technical restrictions on ships that enjoy the right of innocent passage.

9. Is unilateral introduction of technical standards possible?

To provide an answer to the question of whether unilateral enforcement by one coastal state or a joint action by several states of more stringent regulations than those covered by MARPOL’s Annex VI is legally possible, it is necessary to analyse relevant parts of both UNCLOS and MARPOL 73/78.

UNCLOS

Part XII of UNCLOS provides the legal framework for the protection and preservation of the marine environment. As noted above, the practice of IMO shows that this framework can be also used on air pollution from ships that damage terrestrial ecosystems or human health.

The first paragraph of UNCLOS Article 194 reads (my underlining):

“States shall take, individually or jointly as appropriate, all measures consistent with this Convention that are necessary to prevent, reduce and control pollution of the marine environment from any source, using for this purpose the best practicable means at their disposal and in accordance with their capabilities, and they shall endeavour to harmonize their policies in this connection.”

Article 209 says that international rules, regulations and procedures shall be established to prevent, reduce and control pollution of the marine environment from activities in the Area. The Article goes on to declare that the regulations and laws adopted by states for the implementation of international rules and regulations “shall be no less effective” than the international rule in question. The interpretation of this must be that international rules and regulations for the protection of the environment are minimum requirements.

Article 211:1 says “That states, acting through the competent international organisation or general diplomatic conference, shall establish international rules and standards to prevent, reduce and control pollution of the marine environment from vessels.” Article 211:3, however, adds that “States which establish particular requirements for the prevention, reduction and control of pollution of the marine environment as a condition for the entry of foreign vessels into their ports or internal waters shall give due publicity to such requirements and shall communicate them to the competent international organisation”.

Article 211:4 gives coastal states, in the exercise of their sovereignty within their territorial sea, the right to “adopt laws and regulations for the prevention, reduction and control of marine pollution from foreign vessels exercising the right of innocent passage.”

What is sanctioned for internal waters may not necessarily be allowed for enforcement on traffic in the economic zone of a coastal state. However, Article 211:6(a) provides an opportunity for additional measures in a case where the international rules and standards mentioned in Article 211:1 are “inadequate to meet special circumstances and coastal states have reasonable grounds for believing that a particular, clearly defined area of their respective exclusive economic zones is an area where the adoption of special mandatory measures for the prevention of pollution from vessels is required for recognized technical reasons in relation to its oceanographical and ecological conditions”.

States wishing to introduce such mandatory measures “may”, after appropriate consultations through the competent international organisation with any other states concerned, “direct a communication to that organisation, submitting scientific and technical evidence in support and information on necessary reception facilities”. The last two words are a bit odd in this context as Article 211:1 refers to pollution of any sort.

Within 12 months after receiving such a communication, the organisation shall determine whether the conditions in that area correspond to the requirements set out above. If the organization so determines, the coastal States may, for that area, adopt laws and regulations for the prevention, reduction and control of pollution from vessels implementing such international rules and standards or navigational practices as are made applicable, through the organisation, for special areas. These laws and regulations shall not become applicable to foreign vessels until 15 months after the submission of the communication to the organisation.

Such additional laws and regulations may, according to Article 211:6(c), relate to discharges or navigational practices but shall not require foreign vessels to observe design, construction, manning or equipment standards other than generally accepted international rules and standards. This is a strange constraint as it, if read literally, means that a coastal state cannot use Article 211:6 for any mandatory measure affecting foreign vessels that goes beyond the internationally established rules and standards mentioned in 211:1. Such an interpretation would imply that Article 211:6(a) is obsolete!

MARPOL 73/78

MARPOL's Annex VI includes a global cap of 4.5 per cent on the sulphur content of fuel oil and calls on IMO to monitor the worldwide average sulphur content of fuel. In addition Annex VI contains provisions allowing for special "SO_x Emission Control Areas" to be es-

³ Note that Article 212:2 refers to “States”, not to flag States.

established with more stringent control on sulphur emissions. The Baltic Sea is designated as a SO_x Emission Control Area in the Protocol, demanding as of 19 May 2006 that all ships use either fuel oil with sulphur content not exceeding 1.5 per cent or emission-cleaning systems reaching equivalent standards. The North Sea will also become a special SO_x emission control area when amendments to Annex VI have been adopted by the MECP.

Annex VI sets limits on emissions of nitrogen oxides (NO_x) from diesel engines. A mandatory NO_x Technical Code, developed by IMO, defines how this is to be done. However, the limit values for NO_x represent the state of the art machinery of the 1990s rather than what can be achieved by making use of the Best Available Techniques. Annex VI does not contain provisions allowing an area to be declared a special "NO_x Emission Control Area".

Special Areas and Particularly Sensitive Sea Areas under MARPOL

In Annexes I, II and V, MARPOL 73/78 defines certain sea areas as "**special areas**" in which, for technical reasons relating to their oceanographical and ecological condition, and to their sea traffic, the adoption of special mandatory methods for the prevention of sea pollution is required. Under the Convention, these special areas are provided with a higher level of protection than other areas of the sea.

The Baltic Sea area has been designated as a special area under Annexes I, II, IV and V, and far-reaching prohibitions and restrictions on any discharge into the sea of oil or oily mixtures, noxious liquid substances and garbage have been introduced by the Baltic Sea States. In addition, regulations concerning the discharge of sewage into the sea and the prohibition of incineration of ship-generated wastes in the territorial seas of the Baltic Sea States have been adopted by the Contracting Parties to the Helsinki Convention. There is also a general ban on dumping and incineration of other wastes, not incidental to or derived from the normal operation of ships, in the entire Baltic Sea area.

A **Particularly Sensitive Sea Area (PSSA)** is an area that needs special protection through action by IMO because of its significance for recognized ecological, socio-economic or scientific reasons and which may be vulnerable to damage by international maritime activities. The criteria for the identification of particularly sensitive sea areas and the criteria for the designation of special areas are not mutually exclusive. In many cases a Particularly Sensitive Sea Area may be identified within a Special Area and vice versa.

Guidelines on designating a "particularly sensitive sea area" (PSSA) are contained in resolution A. 927(22) Guidelines for the Designation of Special Areas under Marpol 73/78 and Guidelines for the Identification and Designation of Particularly Sensitive Sea Areas. These guidelines include criteria to allow areas to be designated as PSSA if they fulfil a number of criteria, which include: ecological criteria, such as unique or rare ecosystem, diversity of the ecosystem or vulnerability to degradation by natural events or human activities; social, cultural and economic criteria, such as significance of the area for recreation or tourism; and scientific and educational criteria, such as biological research or historical value.

When an area is approved as a particularly sensitive sea area, specific measures can be used to control the maritime activities in that area, such as routing measures, strict application of MARPOL discharge and equipment requirements for ships, such as oil tankers; and installation of Vessel Traffic Services (VTS).

There are currently seven designated PSSAs. The Marine Environment Protection Committee (MEPC) has also in principle approved four additional PSSAs, among which is the Baltic Sea (except Russian waters).

The Guidelines for the Identification and Designation of PSSAs state that a PSSA is an area that needs special protection through action by IMO because of its significance for recognized ecological, socio-economic, or scientific reasons and which may be vulnerable to damage by international shipping activities.

From the guidelines, it is obvious that designating an area as a PSSA aims at the protection of marine ecosystems including the economic value of such systems and the coast to nations bordering the sea. The PSSA institute does not aim at the protection of terrestrial ecosystems or the health of humans living in cities and towns along the coast of the sea or in the hinterland.

The Helsinki Convention is completely focused on the state of the sea. It does not include any provisions for the protection of the terrestrial ecosystems surrounding the Baltic Sea or for the protection of human health.

Conclusions

Annex VI of MARPOL regulates the minimum requirements where emissions of NO_x and SO_x from ships are concerned. The Annex does not contain provisions for designating a sea area as a "special area" for the prevention of airborne emissions. Instead, it provides the basis for allowing special "SO_x Emission Control Areas" to be established, motivated by the attendant adverse impacts on land and sea areas.

The guidelines on designating a "particularly sensitive sea area" (PSSA) aim exclusively at the protection of the sea and can hardly be used for introducing stringent rules for the control of emissions that harm terrestrial ecosystems or the health of humans.

It is obvious that the international rules and standards that UNCLOS refers to are those established, at any time, by the IMO. Where NO_x and SO_x are concerned, relevant standards will be established when MARPOL's Annex VI enters into force. However, UNCLOS does recognise the potential need for more stringent pollution requirements in territorial waters as well as in the economic zone and thus provides a procedure by which coastal states can carry out appropriate consultations through the competent international organisation (i.e. the IMO) with any other states concerned.

UNCLOS Article 211:6(a) provides an opportunity for additional mandatory measures by coastal states in their respective exclusive economic zones when the prevention of pollution from vessels is required for recognized technical reasons in relation to ecological conditions.

The conclusion should be that coastal states may under certain conditions introduce more stringent emission standards not only in territorial waters but also in their respective economic zones for the protection not only of sensitive sea areas but also for the protec-

tion of human health, vulnerable terrestrial and freshwater ecosystems, materials and the cultural heritage, etc. However, the procedure might take considerable time, in particular in a case where the action is questioned by other States.

10. Avoiding a potential conflict with other flag States

The potential conflict with other flag States could be avoided, if the coastal States concerned use flexible policy instruments such as non-revenue raising charges instead of mandatory technical standards. A way to avoid a conflict with the right of innocent passage, would be to use charges on NO_x and SO_x and make clear that they are relevant only to ships calling at ports in states that have chosen to participate in the scheme.

This means that no ship is charged for crossing the Baltic Sea on its way to a port that is not participating. This would, for instance, be the case for trips to Russian ports, if the coastal states belonging to the European Union choose to participate but Russia decided not to. If designed in this way, the charge would be part of the dues that a ship would have to pay to be allowed to load or unload in a port. The fact that the fee would correspond to emissions emitted from the point of entry into Baltic Sea waters (at 57° 44.43'N) or since departure from another Baltic port, would not necessarily imply a violation of the right of innocent passage. The shipowner or his customers could alternatively choose a port that is not part of the programme, a risk that those creating and adopting the scheme must be aware of.

When designed in this manner, the introduction of a distant-related en-route charge is neither conditional on amendments to MARPOL nor on the approval of non-participating States.

11. Is there a conflict with UNCLOS Article 26?

Article 26 declares that no charge may be levied upon foreign ships by reason only of their passage through the territorial sea, and that charges may be levied upon a foreign ship passing through the territorial sea as payment only for specific services rendered to the ship and only in a non-discriminatory manner.

In the case of a revenue neutral charge there will be no net payment levied upon foreign ships and the right of passage would not be violated. However, ship owners who take measures that reduce emissions of SO_x and NO_x would receive more than they pay, and owners of high polluting ships would pay more than they get back. The latter would thus pay a net fee that is higher than the potential costs for specific services rendered to the ship. This could hardly be regarded a violation of Article 26 and is exactly what happens within the existing Swedish scheme for environmentally differentiated fairway dues. The only difference between the current Swedish model and the proposed scheme is that the latter would reflect the distance travelled in the Baltic waters, including the economic zones, of the participating states. This is a minor divergence rather than a difference in kind. One should also observe that UNCLOS does not limit the right of coastal states to introduce non-discriminatory charges on voluntary port calls.

12. Who would object?

There is no reason to believe that anybody would file a legal complaint against a scheme for distance-related en-route charges in the case where the dues are collected in addition to the existing port dues in the participating states. There would be no legal ground for such a complaint, and non-participating states in the area concerned or in a neighbouring sea area would have no reason to complain as the scheme does not conflict with the right of innocent passage. They would rather have reasons not to complain as their ports might gain from being “free riders”, a risk that the participating states would have to consider when they decide on the size of the charges.

High-emitting vessels registered in other flag states could potentially have reasons to complain. However, Sweden’s differentiation of its fairway dues has not caused any such complaints. And would any flag state care to complain in favour of a high-emitting and frequent visitor that carries its flag? Non-frequent visitors would anyway be exempted.

If after all a complaint is made, it would have to be dealt with according to the rules of UNCLOS. The text in the box is from UNCLOS’ website and describes the procedures for settlement of disputes.

Settlement of Disputes

Provisions for the settlement of disputes arising out of an international treaty are often contained in a separate optional protocol. Parties to the treaty could choose to be bound by those provisions or not by accepting or not accepting the Protocol. The Convention on the Law of the Sea is unique in that the mechanism for the settlement of disputes is incorporated into the document, making it obligatory for parties to the Convention to go through the settlement procedure in case of a dispute with another party.

During the drafting of the Convention, some countries were opposed in principle to binding settlement to be decided by third party judges or arbitrators, insisting that issues could best be resolved by direct negotiations between States without requiring them to bring in outsiders. Others, pointing to a history of failed negotiations and long-standing disputes often leading to a use of force, argued that the only sure chance for peaceful settlement lay in the willingness of States to bind themselves in advance to accept the decisions of judicial bodies.

What emerged from the negotiations was a combination of the two approaches.

If direct talks between the parties fail, the Convention gives them a choice among four procedures - some new, some old: submission of the dispute to the International Tribunal for the Law of the Sea, adjudication by the International Court of Justice, submission to binding international arbitration procedures or submission to special arbitration tribunals with expertise in specific types of disputes. All of these procedures involve binding third-party settlement, in which an agent other than the parties directly involved hands down a decision that the parties are committed in advance to respect.

13. Would a decision require unanimity in the EU?

NERA (2004) draws attention to the fact that programmes that may be considered as tax regimes would be difficult to introduce as they require an unanimous vote in the European Council. However, distance-related en-route charges that apply to calls at ports in some Member States do not require a vote by the Council at all. According to the Treaty's principle of subsidiarity, Member States are free to act in areas that do not require common legislation provided that the measures taken are non-discriminatory and proportional to the objective pursued. If Member States bordering the Baltic Sea feel that they need to protect their environment from airborne pollutants from ships, other Member States have no reason to object so long as ships or cargo owners registered in their countries are not discriminated.

Alternatively, if the European Commission thinks that the Baltic scheme is of such importance that it should be introduced by common law, the decision about the directive can be taken by qualified majority as it does not set any tax rates. It is rather a framework of much the same character as the existing directive on road charging.

14. A legal structure for distance-related en-route charges

There is no European authority for emissions at sea, and HELCOM's authority is limited to emissions and discharges that affect the sea. HELCOM's authority could be extended but a decision to that effect would have to be taken by the Parties to the Helsinki Convention. This might be difficult in a situation where, potentially, one or several coastal states may choose not to participate.

The new European Maritime Safety Agency (EMSA) could potentially be another option, at least if the decision is taken by the European Union rather than by some of its Member States. The goals of EMSA are to reduce the risk of maritime accidents, marine pollution from ships and the loss of human lives at sea. The Agency, however, is primarily concerned with the prevention of accidents and illegal discharges than with the "normal" emissions of sea vessels.

In a Communication entitled *Towards a Strategy to Protect and Conserve the Marine Environment* (COM(2002)539 final), the Commission presented its initial analysis and approach to building a Marine Strategy aimed at protecting Europe's seas. The Commission proposes an integrated approach taking into account all pressures on the marine environment and setting clear sustainable objectives and targets to be met through a set of cost-effective measures.

According to the communication, the creation of a new **Marine Framework Directive** would be applicable to all European marine waters under the sovereignty or jurisdiction of the Member States. The objective of the directive would be to protect, conserve and improve the quality of the marine environment in these marine waters, through the achievement of good environmental status in European seas within a defined time period.

The directive will define ecosystem-based marine regions as the implementation unit. They will be defined on the basis of their hydrological, oceanographic and bio-geographic features. Here, again, the emphasis is on marine ecosystems rather than on marine eco-

systems and the protection of terrestrial ecosystems and human health from emissions from ships.

The choice of legal model for joint implementation of a scheme of distance-related en-route charges depends above all on whether the system set up for charging, recycling of revenues and surveillance of the ships concerned, would also be used for other purposes. One possible extension of the system would be to use the same model that for charging ships for the cost to port-based facilities taking care of sludge and oily water. Creating a common scheme for handling the fees could be a fair way of making sure that all ships pay what they should and that all ports are fully compensated for the costs. The agency in charge of the system would in this case create a routine for reporting which all participating ships and ports are obliged to use. The database and the AIS system would be used for monitoring compliance.

Potentially, the agency could also be commissioned to carry out work on behalf of the Fisheries Control Agency (CFCA) and the relevant agencies of the Member States, i.e. to use the AIS system to control that fishing vessels do not operate in forbidden waters or unload in non-authorised ports. All such vessels (15 m and longer) are already part of the European Vessel Monitoring System (VMS). As the Baltic centre would operate around the clock, allowing it to carry out several tasks that involve the use of the AIS system, this would presumably save quite a bit of money. Coordination of rescue operations that involve ships, helicopters and aircraft from several coastal states is yet another task that the centre could be entrusted to carry out. Maybe a special **Baltic Sea Inspectorate** or **Baltic Sea Monitoring Centre** would be the kind of body needed for these tasks.

15. Further work

This paper represents the first step towards an investigation of the feasibility of creating a scheme for kilometer charging of sea vessels in the Baltic Sea. Besides the legal aspects, it is necessary to make an in-depth analysis of the size of the charges and of how the revenue would be returned to the shipping sector. The idea of combining, in the same centre, the administration of the en-route charge with other tasks based on the AIS system also requires further elaboration.

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